

What is claimed is:

1 1. A cover for an image sensor array, the cover
2 comprising:

3 a plate formed of substantially transparent material and
4 placed adjacent to the image sensor array, said plate having a
5 plurality of surfaces forming a lensing structure, such that
6 at least one of said plurality of surfaces is contoured into a
7 lensing surface capable of changing imaging characteristics.

2. The cover of claim 1, wherein said plate is made of
a transparent material which is one of glass, plastic, or
plexiglass, said plate being transparent over all, or a
substantial portion of, the image sensor array.

3. The cover of claim 1, wherein said lensing structure
is made of at least one lensing element, said lensing
structure covering all or a substantial portion of the image
sensor array, such that said at least one lensing element is
formed on the lensing surface.

4. The cover of claim 3, wherein said at least one
lensing element is a refractive lensing element.

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5. The cover of claim 4, wherein said refractive lensing element includes a concave lens.

6. The cover of claim 4, wherein said refractive lensing element includes a convex lens.

7. The cover of claim 4, wherein said refractive lensing element forms a post having at least one lensing surface.

8. The cover of claim 3, wherein said at least one lensing element is a diffractive lensing element, said diffractive lensing element blazed on the lensing surface.

9. The cover of claim 3, wherein said at least one lensing element is a hybrid refractive-diffractive lensing element, said hybrid lensing element being formed with a diffraction grating blazed on the refractive lensing surface.

10. The cover of claim 1, wherein said lensing structure is a mounting structure formed on the lensing surface of the plate for attaching additional lensing elements to the plate.

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1 11. The cover of claim 10, wherein said lensing
2 structure also includes an alignment mark, formed on the
3 lensing surface, to guide the additional lensing elements when
4 attaching to the plate.

1 12. The cover of claim 10, wherein said mounting
2 structure is formed by a mesa-like protrusion on the lensing
3 surface.

11. The cover of claim 10, wherein said mounting
structure is formed by a ringed-wall structure having an
inside wall and an outside wall, said ringed-wall structure
formed on the lensing surface.

14. The cover of claim 13, further comprising a threaded
retaining ring on the inside wall for firmly attaching the
additional lensing element to the plate.

1 15. The cover of claim 13, further comprising a threaded
2 retaining ring on the outside wall for firmly attaching the
3 additional lensing element to the plate.

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1 16. The cover of claim 13, wherein said mounting
2 structure is formed by a well-like depression on the lensing
3 surface.

1 17. The cover of claim 16, further comprising a threaded
2 retaining ring on the inside wall of the depression for firmly
3 attaching the additional lensing element to the plate.

1 18. The cover of claim 3, wherein said lensing
2 structure is a hybrid of lensing elements and mounting
3 structures for additional lensing elements.

1 19. The cover of claim 18, further comprising an
2 alignment mark formed on the lensing surface to guide the
3 additional lensing elements when attaching to the plate.

1 20. A lensing structure coupled to a cover for an image
2 sensor array, the structure comprising:

3 an element made of substantially transparent material and
4 having a lensing surface, said element formed on or with the
5 cover, such that said lensing surface of said element changes
6 the incoming light.

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1 21. The structure of claim 20, wherein the lensing
2 structure and the cover is injection molded into a single-
3 piece cover plate.

1 22. The structure of claim 20, wherein the changing
2 includes said element functioning as an additional lensing
3 element.

1 23. The structure of claim 20, wherein the changing
includes said element functioning as a mounting structure or
alignment marks to attach other lensing elements to the cover.

24. The structure of claim 20, wherein the image sensor
array is a charge-coupled device sensor array.

25. The structure of claim 20, wherein the image sensor
array is an active pixel sensor array that has a follower
transistor and a selection transistor in each pixel.

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1 26. An image sensor camera system for converting optical
2 data into digital image data, the system comprising:

3 an image sensor array having a plurality of sensors, said
4 sensors operating to receive the optical data and integrate
5 the data into electrical charge proportional to the amount of
6 optical data collected within a particular period of time;

7 a lens system operatively coupled to the image sensor
8 array and configured to carry and focus the optical data onto
9 the image sensor array, said lens system including a plurality
10 of lenses and a cover plate, said cover plate contoured into a
11 lensing structure that changes an imaging characteristic; and

12 sensor electronics coupled to the image sensor array, and
13 configured to receive the electrical charge, the sensor
14 electronics operating to convert the electrical charge
15 received by the plurality of sensors into the digital image
16 data.

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PATENT

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1 28. A method of contouring an image sensor array cover
2 plate for imaging improvement or enhancement function, the
3 method comprising:

4 forming a lensing structure on a lensing surface of the
5 cover plate by contouring said lensing surface of the cover
6 plate into a lensing element.

1 29. The method of claim 28, wherein forming a lensing
2 structure includes blazing diffraction grating on said lensing
3 surface.

4 30. The method of claim 28, wherein said lensing
5 structure is attached to said cover plate.

6 31. The method of claim 28, wherein said lensing
7 structure and said cover plate are injection molded as a
8 single-piece structure.